

In the Claims

Please amend the claims as follows:

1 1. (Currently Amended) A method of data transfer between a
2 source port and a destination port of a transfer controller with
3 plural ports, said method comprising the steps of:

4 in response to a data transfer request, querying said
5 destination port to determine if said destination port is capable
6 of receiving data of a predetermined size;

7 if said destination port is not capable of receiving data of
8 said predetermined size, waiting by not reading data of said
9 predetermined size from said source port corresponding to said data
10 transfer request, not storing data read from said source port in
11 intermediate buffers and not transferring data to said destination
12 port thereby not blocking reading data from said source port until
13 said destination port is capable of receiving data; ~~and~~

14 if said destination port is capable of receiving data of said
15 predetermined size, reading data of said predetermined size from
16 said source port and transferring said read data to said
17 destination port; and

18 while waiting until said destination port is capable of
19 receiving data

20 determining if a second data transfer request is pending
21 between said source port and a second destination port, and

22 if a second data transfer request is pending

23 querying said second destination port to determine
24 if said second destination port is capable of receiving
25 data of said predetermined size,

26 if said second destination port is not capable of
27 receiving data of said predetermined size, waiting by not
28 reading data of said predetermined size from said source
29 port corresponding to said second data transfer request,

30 not storing data read from said source port in
31 intermediate buffers and not transferring data to said
32 second destination port thereby not blocking reading data
33 from said source port until said second destination port
34 is capable of receiving data, and
35 if said second destination port is capable of
36 receiving data of said predetermined size, reading data
37 of said predetermined size from said source port and
38 transferring said read data to said second destination
39 port.

1 2. (Currently Amended) The method of claim 1, wherein each
2 port includes at least one write reservation station, said method
3 wherein:

4 said step of querying said destination port includes:
5 determining whether any write reservation station capable
6 of storing data of said predetermined size of said destination
7 port has not been allocated for receipt of data,
8 if at least one write reservation capable of storing data
9 of said predetermined size is not allocated for receipt of
10 data, determining said destination port can receive data and
11 allocating a write reservation station capable of storing data
12 of said predetermined size for receipt of data; and
13 said step of transferring said read data to said destination
14 port includes transferring said read data to said allocated write
15 reservation station of said destination port.

1 3. (Original) The method of claim 2, further comprising:
2 transferring data from a write reservation station storing
3 data to be transferred to an application unit coupled to said
4 destination port at a data transfer rate of said application unit;
5 and

6 disallocating said write reservation station upon transfer of
7 data to said application unit.

1 4. (Original) The method of claim 2, wherein:

2 said step of allocating a write reservation station includes
3 storing a data identifier corresponding to said write reservation
4 station; and

5 said step of transferring said read data to said destination
6 port includes storing said read data in a write reservation station
7 having a data identifier corresponding to said read data.

Claims 5 and 6. (Canceled)

1 7. (Currently Amended) A data transfer controller comprising:

2 a request queue controller receiving, prioritizing and
3 dispatching data transfer requests, each data transfer request
4 specifying a data source, a data destination and a data quantity to
5 be transferred;

6 a data transfer hub connected to request queue controller
7 effecting dispatched data transfer requests;

8 a plurality of ports, each of said plurality of ports having
9 an interior interface connected to said data transfer hub and an
10 exterior interface configured for an external memory/device
11 expected to be connected to said port, said interior interface and
12 said exterior interface operatively connected for data transfer
13 therebetween; and

14 said data transfer hub controlling data transfer from a source
15 port corresponding to said data source to a destination port
16 corresponding to said data destination in a quantity corresponding
17 to said data quantity to be transferred of a currently executing
18 data transfer request, said data transfer hub further controlling
19 said source port and said destination port to

20 in response to a data transfer request, query said
21 destination port to determine if said destination port is
22 capable of receiving data of a predetermined size,

23 if said destination port is not capable of receiving data
24 of said predetermined size, waiting by not reading data of
25 said predetermined size from said source port corresponding to
26 said data transfer request and not transferring data to said
27 destination port thereby not blocking reading data from said
28 source port until said destination port is capable of
29 receiving data, and

30 if said destination port is capable of receiving data of
31 said predetermined size, reading data of said predetermined
32 size from said source port and transferring said read data to
33 said destination port, and

34 said data transfer hub further capable while waiting until
35 said destination port is capable of receiving data of

36 determining if a second data transfer request between
37 said source port and a second destination port is pending,

38 if a second data transfer request is pending

39 querying said second destination port to determine
40 if said second destination port is capable of receiving
41 data of said predetermined size,

42 if said second destination port is not capable of
43 receiving data of said predetermined size, waiting by not
44 reading data of said predetermined size from said source
45 port corresponding to said second data transfer request
46 thereby not blocking reading data from said source port
47 until said second destination port is capable of
48 receiving data, and

49 if said second destination port is capable of
50 receiving data of said predetermined size, reading data
51 of said predetermined size from said source port and

52 transferring said read data to said second destination
53 port.

1 8. (Currently Amended) The data transfer controller of claim
2 7, wherein:
3 each port includes at least one write reservation station for
4 storing data prior to transfer to said corresponding external
5 memory/device;
6 said data transfer hub further controlling said destination
7 port to
8 determine whether any write reservation station capable
9 of storing data of said predetermined size of said destination
10 port has not been allocated for receipt of data,
11 if at least one write reservation capable of storing data
12 of said predetermined size is not allocated for receipt of
13 data, determining said destination port can receive data and
14 allocating a write reservation station capable of storing data
15 of said predetermined size for receipt of data, and
16 transfer said read data to said allocated write
17 reservation station of said destination port.

1 9. (Original) The data transfer controller of claim 8,
2 wherein:
3 said data transfer hub further controlling said destination
4 port to
5 transfer data from a write reservation station to said
6 corresponding external memory/device at a data transfer rate
7 of said external memory/device, and
8 disallocating said write reservation station upon
9 transfer of data from said write reservation station to said
10 external memory/device.

1 10. (Previously Amended) The data transfer controller of
2 claim 8, wherein:

3 each of said plurality of ports further includes an identifier
4 register corresponding to each write reservation station; and
5 said data transfer hub further controlling said destination
6 port to

7 allocate a write reservation station by writing
8 identifier data in said corresponding identifier register, and
9 store said read data in a write reservation station
10 having a corresponding identifier stored in said identifier
11 register corresponding to said write reservation station.

Claims 11 and 12 (Canceled).

1 13. (Currently Amended) A data processing system comprising:
2 a plurality of data processors, each data processor capable of
3 generating a data transfer request;

4 a request queue controller connected to said plurality of data
5 processors, said request queue controller receiving, prioritizing
6 and dispatching data transfer requests, each data transfer request
7 specifying a data source, a data destination and a data quantity to
8 be transferred;

9 a data transfer hub connected to request queue controller
10 effecting dispatched data transfer requests;

11 a plurality of ports, each of said plurality of ports having
12 an interior interface connected to said data transfer hub
13 identically configured for each port and an exterior interface
14 configured for an external memory/device expected to be connected
15 to said port, said interior interface and said exterior interface
16 operatively connected for data transfer therebetween; and

17 said data transfer hub controlling data transfer from a source
18 port corresponding to said data source to a destination port

19 corresponding to said data destination in a quantity corresponding
20 to said data quantity to be transferred of a currently executing
21 data transfer request, said data transfer hub further controlling
22 said source port and said destination port to

23 in response to a data transfer request, query said
24 destination port to determine if said destination port is
25 capable of receiving data of a predetermined size,

26 if said destination port is not capable of receiving data
27 of said predetermined size, waiting by not reading data of
28 said predetermined size from said source port corresponding to
29 said data transfer request and not transferring data to said
30 destination port thereby not blocking reading data from said
31 source port until said destination port is capable of
32 receiving data, and

33 if said destination port is capable of receiving data of
34 said predetermined size, reading data of said predetermined
35 size from said source port and transferring said read data to
36 said destination port, and

37 said data transfer hub further capable while waiting until
38 said destination port is capable of receiving data of

39 determining if a second data transfer request between
40 said source port and a second destination port is pending,

41 if a second data transfer request is pending

42 querying said second destination port to determine
43 if said second destination port is capable of receiving
44 data of said predetermined size,

45 if said second destination port is not capable of
46 receiving data of said predetermined size, waiting by not
47 reading data of said predetermined size from said source
48 port corresponding to said second data transfer request
49 thereby not blocking reading data from said source port

50 until said second destination port is capable of
51 receiving data, and
52 if said second destination port is capable of receiving
53 data of said predetermined size, reading data of said
54 predetermined size from said source port and transferring said
55 read data to said second destination port.

1 14. (Currently Amended) The data processing system of claim
2 13, wherein:

3 each port includes at least one write reservation station for
4 storing data prior to transfer to said corresponding external
5 memory/device;

6 said data transfer hub further controlling said destination
7 port to

8 determine whether any write reservation station capable
9 of storing data of said predetermined size of said destination
10 port has not been allocated for receipt of data,

11 if at least one write reservation capable of storing data
12 of said predetermined size is not allocated for receipt of
13 data, determining said destination port can receive data and
14 allocating a write reservation station capable of storing data
15 of said predetermined size for receipt of data, and

16 transfer said read data to said allocated write
17 reservation station of said destination port.

1 15. (Original) The data processing system of claim 14,
2 wherein:

3 said data transfer hub further controlling said destination
4 port to

5 transfer data from a write reservation station to said
6 corresponding external memory/device at a data transfer rate
7 of said external memory/device, and

8 disallocate said write reservation station upon transfer
9 of data from said write reservation station to said external
10 memory/device.

1 16. (Original) The data processing system of claim 14,
2 wherein:
3 each of said plurality of hubs further includes an identifier
4 register corresponding to each write reservation station; and
5 said data transfer hub further controlling said destination
6 port to
7 allocate a write reservation station by writing
8 identifier data in said corresponding identifier register, and
9 store said read data in a write reservation station
10 having a corresponding identifier stored in said identifier
11 register corresponding to said write reservation station.

Claims 17 and 18 (Canceled)

1 19. (Previously Amended) The data processing system of claim
2 13, further comprising:
3 said plurality of ports includes an internal port master;
4 a data transfer bus connected to said internal port master and
5 each of said data processors, said data transfer bus transferring
6 data between said plurality of data processors and said data
7 transfer hub via said internal port master;
8 a system memory connected to a predetermined one of said
9 plurality of ports; and
10 wherein each of said data processors includes an instruction
11 cache connected to said data transfer bus for temporarily storing
12 program instructions controlling said data processor, said data
13 processor generating a data transfer request to said request queue
14 controller for instruction cache fill from said system memory to

15 said instruction cache upon a read access miss to said instruction
16 cache.

1 20. (Previously Amended) The data processing system of claim
2 13, further comprising:

3 said plurality of ports includes an internal port master;
4 a data transfer bus connected to said internal port master and
5 each of said data processors, said data transfer bus transferring
6 data between said plurality of data processors and said data
7 transfer hub via said internal port master;

8 a system memory connected to a predetermined one of said
9 plurality of ports; and

10 wherein each of said data processors includes a data cache
11 connected to said data transfer bus for temporarily storing data
12 employed by said data processor, said data processor generating a
13 data transfer request to said request queue controller for data
14 cache fill from said system memory to said data cache upon a read
15 access miss to said data cache.

1 21. (Previously Amended) The data processing system of claim
2 13, further comprising:

3 said plurality of ports includes an internal port master;
4 a data transfer bus connected to said internal port master and
5 each of said data processors, said data transfer bus transferring
6 data between said plurality of data processors and said data
7 transfer hub via said internal port master;

8 a system memory connected to a predetermined one of said
9 plurality of ports; and

10 wherein each of said data processors includes a data cache
11 connected to said data transfer bus for temporarily storing data
12 employed by said data processor, said data processor generating a
13 data transfer request to said request queue controller for data

14 writeback from said data cache to said system memory upon a write
15 miss to said data cache.

1 22. (Previously Amended) The data processing system of claim
2 13, further comprising:

3 said plurality of ports includes an internal port master;
4 a data transfer bus connected to said internal port master and
5 each of said data processors, said data transfer bus transferring
6 data between said plurality of data processors and said data
7 transfer hub via said internal port master;

8 a system memory connected to a predetermined one of said
9 plurality of ports; and

10 wherein each of said data processors includes a data cache
11 connected to said data transfer bus for temporarily storing data
12 employed by said data processor, said data processor generating a
13 data transfer request to said request queue controller for write
14 data allocation from said system memory to said data cache upon a
15 write miss to said data cache.

1 23. (Previously Amended) The data processing system of claim
2 13, further comprising:

3 said plurality of ports includes an internal port master;
4 a data transfer bus connected to said internal port master and
5 each of said data processors, said data transfer bus transferring
6 data between said plurality of data processors and said data
7 transfer hub via said internal port master;

8 a system memory connected to a predetermined one of said
9 plurality of ports; and

10 wherein each of said data processors includes a data cache
11 connected to said data transfer bus for temporarily storing data
12 employed by said data processor, said data processor generating a
13 data transfer request to said request queue controller for data

14 writeback from said data cache to said system memory upon eviction
15 of dirty data from said data cache.

1 24. (Original) The data processing system of claim 13,
2 wherein:

3 said plurality of data processors, said request queue
4 controller, said data transfer hub and said plurality of ports are
5 disposed on a single integrated circuit.

1 25. (Currently Amended) The data processing system of claim
2 13, further comprising:

3 a data memory having a data transfer bandwidth on the same
4 order as a data transfer bandwidth of said data transfer hub;

5 an internal memory port connected to said data transfer hub
6 and said data memory; and

7 said data transfer hub further controlling said source port
8 and said destination port to not query said internal memory port to
9 determine if said destination port is capable of receiving data of
10 a predetermined size, read data of said predetermined size from
11 said source port and transfer said read data to said destination
12 port via said data transfer hub if said internal memory port is a
13 destination port of a data transfer request.